67: Maude K-5 (1961) 1973 OU9 Tonga OU9

While the second of the three situations outlined above is a possible explanation of the failure to improve agricultural techniques in Tonga, another type of explanation—that such improvements are not yet necessary—seems most likely to be correct. As suggested earlier, the soils are of high inherent fertility, and shifting cultivation systems can withstand a good deal of intensification before fundamental changes are essential. The adoption of cassava and dryland varieties of taro, both of which were introduced into Tonga in the nineteenth century, has helped to maintain yields per man-hour as cropping has been intensified, while the adoption of the metal push-hoe has enabled farmers to cope with the changes in the fallow vegetation. Such adaptations in the agricultural system may well be sufficient at the present level of intensity. The symptoms of population pressure are still mild, and the main pressures felt by Tongans, to judge from the material on land problems and migration, are in cash cropping rather than in the food-cropping system. Acceptance of this explanation would thus leave Boserup's thesis in the category of 'not proven', but probable.

However, the fact that the most significant changes in Tongan agriculture, involving such practices as machine preparation of land and the use of chemical fertilizers, have occurred in Tongatapu amongst farmers heavily engaged in cash cropping rather than amongst the less commercialized farmers in more densely-populated Ha'apai, suggests one major qualification to her argument. While land shortage has undoubtedly been a factor in these changes, for they began about the time when land ceased to be easily obtainable in Tongatapu, they indicate that commercialization is also a stimulus to the adoption of improved techniques. Population pressure, as noted above, is felt mostly in cash cropping rather than in food cropping. The income received from cash cropping makes it feasible to purchase industrial inputs such as fertilizers, while changes in cash cropping have repercussions throughout the agricultural system. The increase in the area planted in cash crops, for instance, intensifies the pressure on the bush fallow system, but where food crops are intercultivated with a cash crop like bananas, as is frequently the case, the former benefit from the fertilizer used for the latter, thus making it possible to lengthen the cropping period and reduce the role of the bush fallow. With coconuts, a long-term crop, the need to control bush growth conflicts with the traditional practice of bush fallowing, and the achievement of higher productivity in coconut

metal adzes (toki Tonga), owned by only 2 percent of the sample households. In the cases of machetes, hele pelu, and the two most important spades, the huo keli and the huo lafalafa, many households owned more than one of each. Rakes and shovels are commonest in the urban area of Nuku'alofa where ornamental gardens are more prevalent.

Using only these implements, most Tongan farmers cut down the bush or forest vegetation and after burning the accumulated plant material after drying, prepare the land for planting, plant, weed, and harvest the different crops. An increasing number of farmers, however, are beginning to use the tractor-pulled plow and disc-harrow and, although only one out of 141 households owned a tractor, 53 percent have had their allotments plowed at one time or another, mostly by the Coconut Replanting Scheme or the Agriculture Department for planting new coconuts or other export crops. Of the 140 households interviewed, 43 percent felt that plowing was good for the soil, 44 percent felt that it was bad and caused the soil to become infertile, 13 percent had no opinion. Regardless of the feeling of the average Tongan the Agriculture Department, the Coconut Replanting Scheme, and the Produce Board have been advocating the use of the plow rather than burning the dried vegetable matter. Although the Agriculture Department has experimented with draught animals for plowing, Tongans have never adopted this practice (Government of Tonga, 1952:3).

241 lablab to improve fallow vegetation as well as an increas-
242 ing use of inorganic fertilizers. In most cases, however,
[654] fertilizers were supplied by the Coconut Replanting Scheme or the Agricultural Department for use with coconuts, bananas, watermelons, or export vegetables, rarely for subsistence crops. The practices of mulching or use of animal manure were seldom employed.

241 The use of plows and disc harrows for the clearing
407 and preparation of land was common, and approximately one-half of the allotments have been plowed at one time or another. In most cases, however, plowing was done under
241 [654] the auspices of the Coconut Replanting Scheme. Commercial
[244] crops such as peanuts and watermelons were often grown on plowed land, but plowing for staple root crop production was uncommon.

[244] Most staple crops were well weeded, except for manioc and taro which seemed to compete successfully with weeds.
241 Commercial crops also seemed reasonably well cared for,
245 except in the case of pineapples which were often overrun by secondary growth and some banana plantations where proper desuckering was not practiced and diseased plants were poorly weeded.

241 Tree crops, however, received very little attention,
245 and coconut palms, both mature and replanted, were often
136 found overrun by secondary vegetation, burned around the bases during clearing, or left prey to rat, rhinoceros

/158 cont./

000 kape (less often taro or yams). With these tools they usually work
241 standing. The former, apparently customary, squatting method of work
412 (418)
516

418. See, for example, J. Wilson, A missionary voyage.../cited in English/ p. 245.

407 is used only by a few very old men. Plows as well as other agri-
197 cultural machines and tractors are used by Tongans under the guidance
242 of whites only on the state experimental farms on Tongatapu and on the property of Crown Prince Tungi on this island.

121 The following survey may give an insight into present-day agri-
241 culture and show the changes that have taken place.

244 'ufi - Yams (Dioscorea alata L.)
262 Even in ancient Tonga yams were one of the most important food
198 plants (if not the most important crop). (419)

419. See J. Cook, Beschreibung...loc. cit. VI. pp. 163, 237, 283/284; W. Ellis, An authentic narrative...I. p. 89.

[563] White employees in the Tongan government have so far discovered 80
039] varieties of yams in the Archipelago; more than 20 different names are familiar to the average Tongan. Yams are still the favorite tubers on all the islands, though their total cultivation has decreased in Tonga in comparison with the past (see above); in the Ha'apai group yams are today planted to a lesser extent, whereas their cultivation on the larger islands of the Archipelago (for example, Tongatapu) is still quite extensive and in some places probably corresponds to that of the past.

244 Planting time--with certain shifts as a result of the long north-
221 south extension of the Archipelago--extends from June to the first days of August and from the third week of August up to October-November. As
244 a rule, a yam crop is planted only on land that has rested; suitable
242

101: Clark K-4,5 (1974) 1 78 OU9 Tonga OU9

241 only basic agricultural tools, such as a bush knife, hoe, planting
[412] stick, and spade (Plate 10).A Beyond these, little else is used
[407] for cultivation. Of all landholding Tongans surveyed, only 16
[426] percent used a plow or tractor and, in each case, the implement
[427] was either rented or borrowed.

407 The maintenance of agricultural machinery, in terms of effi-
ciency and materials (i.e., fuel, parts, and lubricants), severely
407 limits the possibility of increased use within Tonga. Interviews
493 within the Tongan Department of Agriculture indicated that this
problem reaches every level of agricultural operation, from trucks
493 to garden tilling machinery. For example, a large truck was cited
as having not been used for over 18 months, because of a broken
transmission gear. The required part, ordered from Japan, had not
398 yet arrived and no one knew if it ever would. In the interim, no
attempt to make the part, in one of the local blacksmith shops, had
493 been made. It was confidentially learned that, should the part
arrive, the truck would remain largely inoperative because of another
damaged gear which was not totally broken and, therefore, not
398 replaced. Other examples of this situation were noted, emphasizing
the serious lack of basic mechanical service.

241 When workable machinery is available for rent, the cost is
427 often prohibitive to the average farmer. Informants also complained
[557] that rental machinery is allocated on the basis of social standing
241 and status, rather than need. Thus, the majority of planting, cul-
tivation, and harvesting on Tonga remains the work of hands, and is
expected to remain so.

A [Due to poor quality of origina reproduction,
A plate has not been marked for Category--
Analyst.]